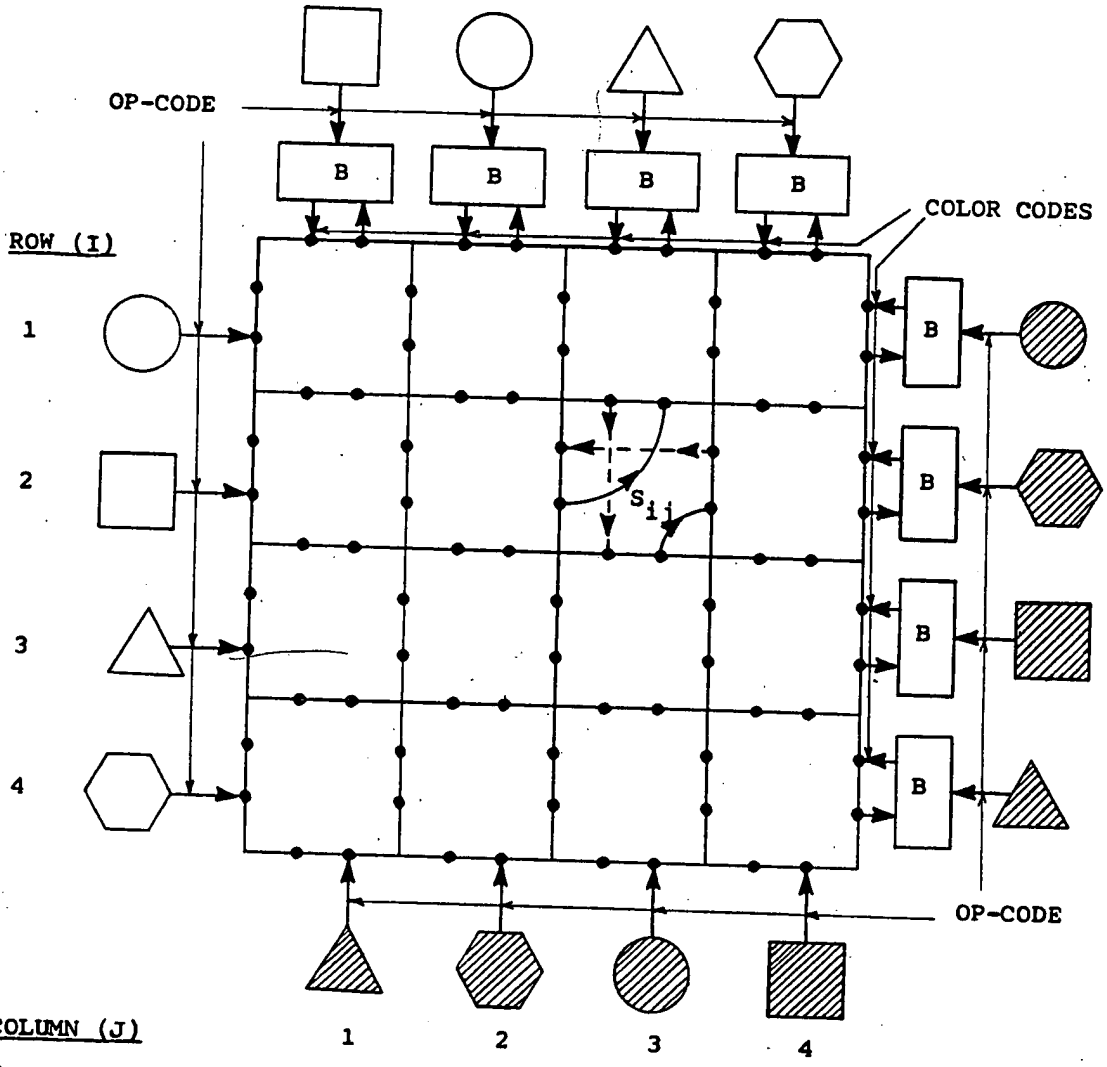


B: BOOLEAN FUNCTION

OBJECT	○	⬡	□	△	●	⬢	■	▲
OP-CODE	000	001	010	011	100	101	110	111

GEOMETRIC LAYOUT OF DEVICE FOR N = 4

FIG. 1

~~376784~~
962971

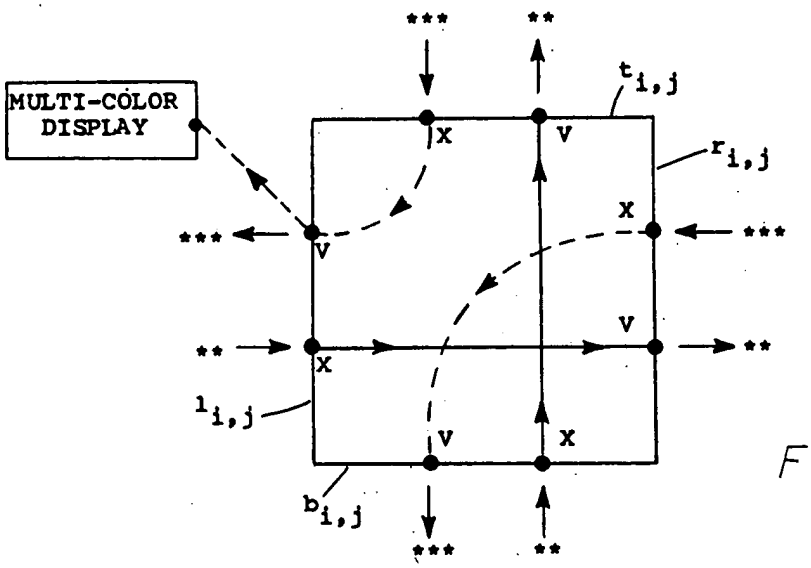


FIG. 2a

SWITCH $W_{i,j}$: ON ("1")

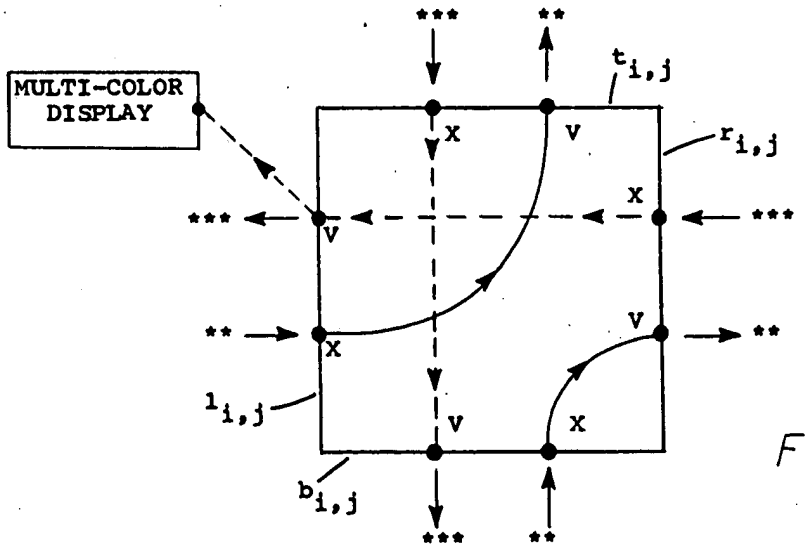
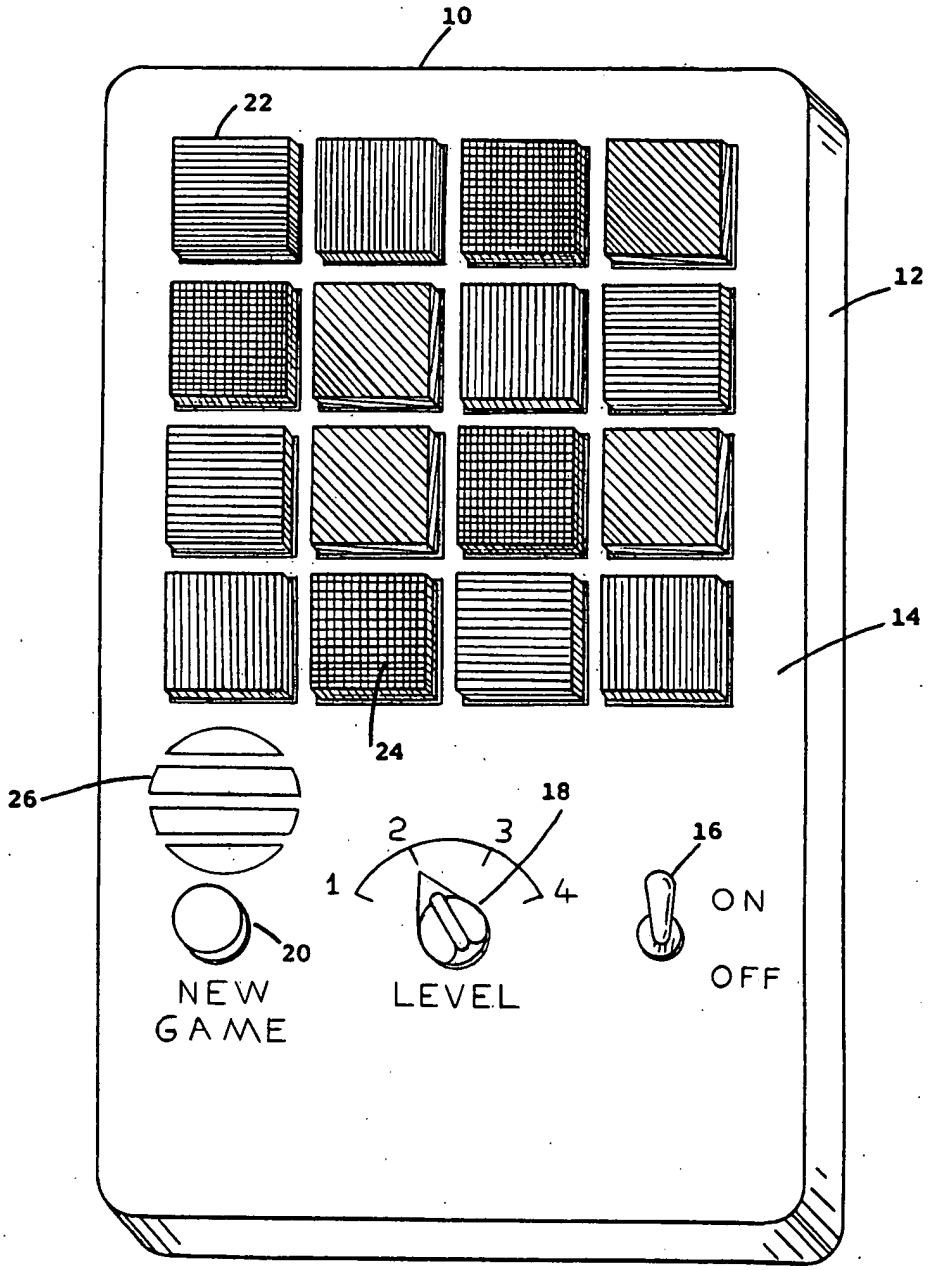


FIG. 2b

SWITCH $W_{i,j}$: OFF ("0")

LEGEND: ** OP-CODE
*** COLOR CODE

ROUTING SQUARE $S_{i,j}$



HAND HELD LOGIC GAME DEVICE

FIG. 3

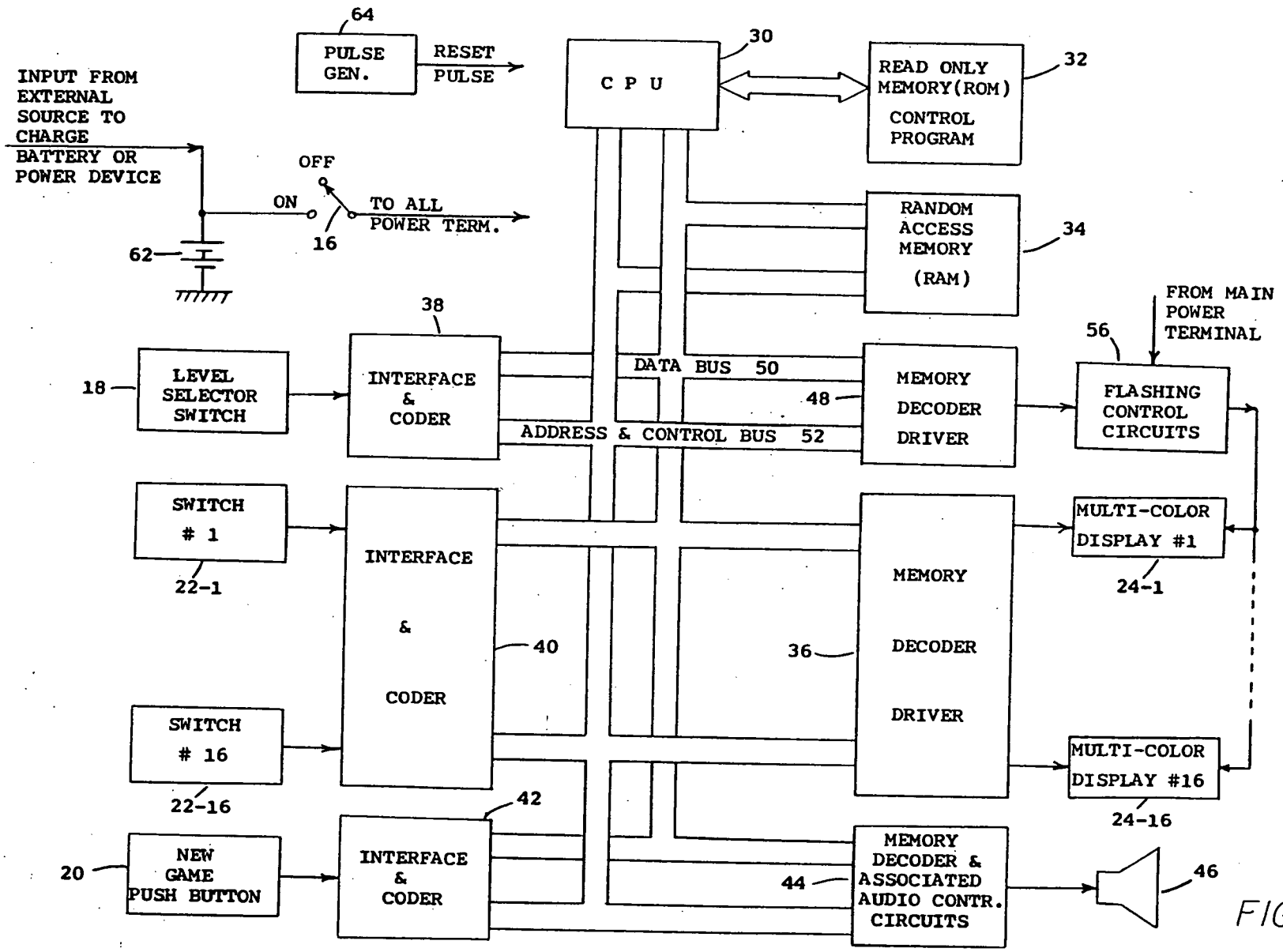


FIG. 4

3,962,971

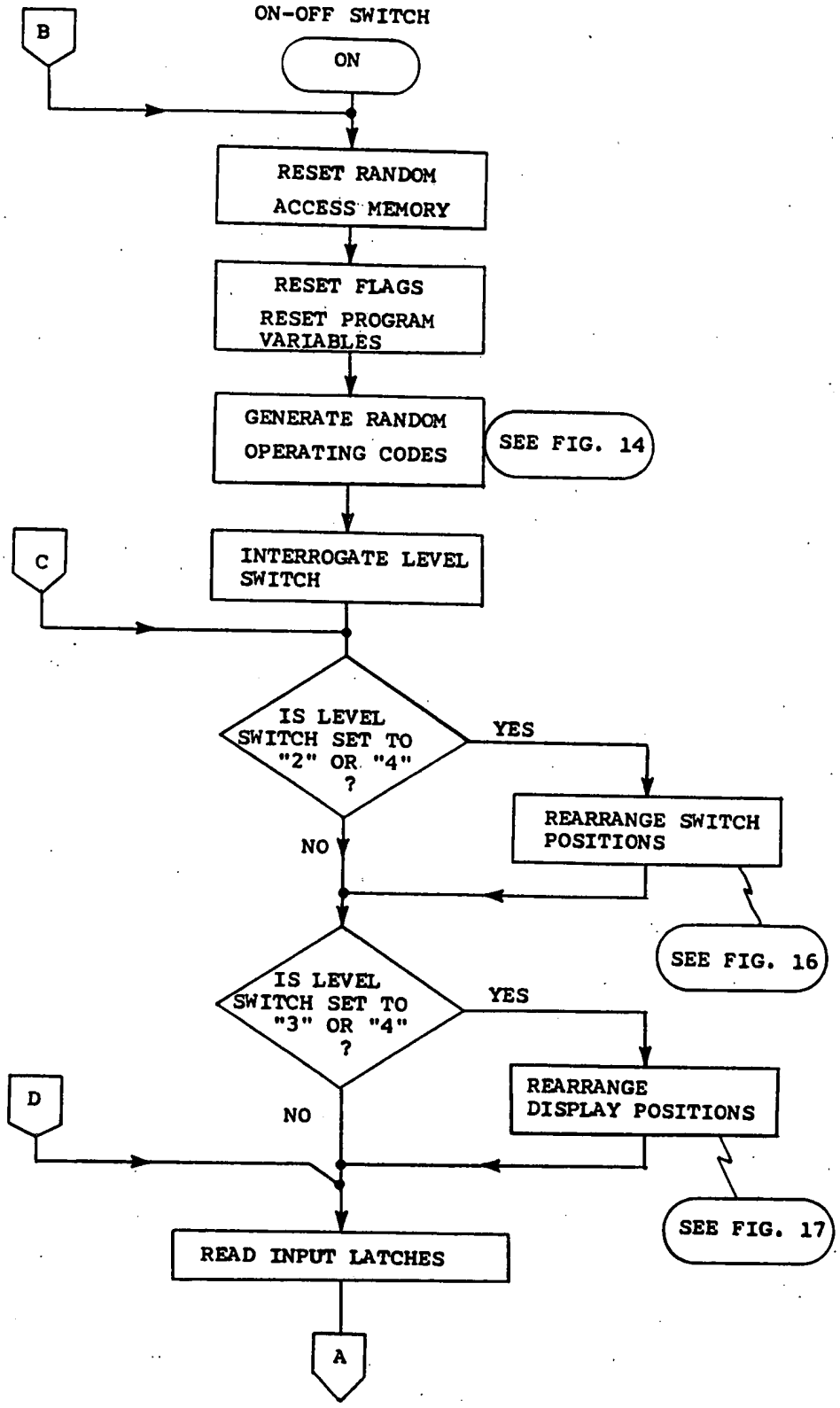

B
ON-OFF SWITCH
ON
RESET RANDOM ACCESS MEMORY
RESET FLAGS
RESET PROGRAM VARIABLES
GENERATE RANDOM OPERATING CODES
SEE FIG. 14
C
INTERROGATE LEVEL SWITCH
IS LEVEL SWITCH SET TO "2" OR "4" ?
YES
NO
REARRANGE SWITCH POSITIONS
SEE FIG. 16
IS LEVEL SWITCH SET TO "3" OR "4" ?
YES
NO
D
REARRANGE DISPLAY POSITIONS
SEE FIG. 17
READ INPUT LATCHES
A

FIG. 5

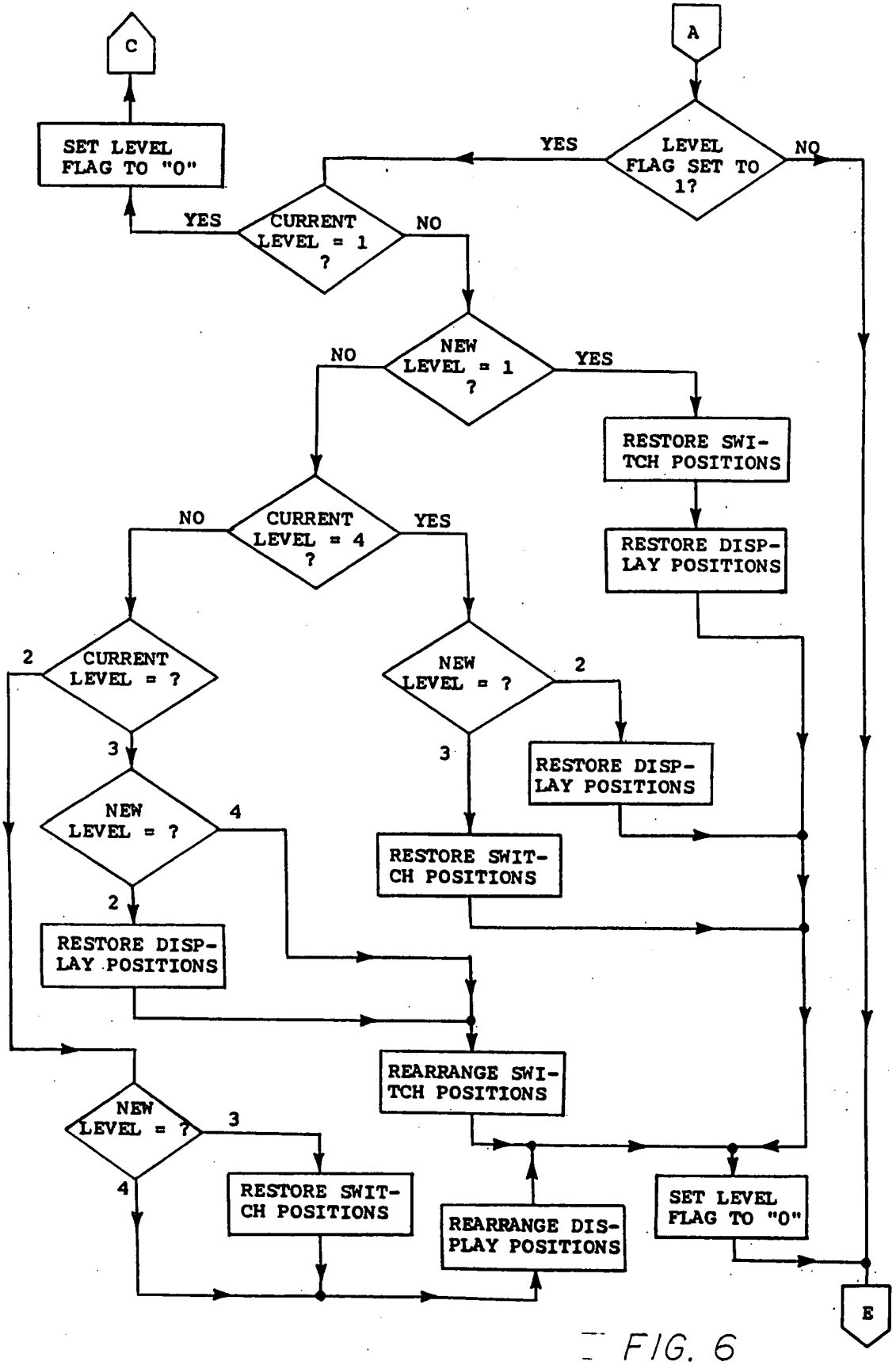

A
LEVEL FLAG SET TO 1?
YES
NO
CURRENT LEVEL = 1 ?
YES
NO
SET LEVEL FLAG TO "0"
C
NEW LEVEL = 1 ?
NO
YES
RESTORE SWITCH POSITIONS
RESTORE DISPLAY POSITIONS
CURRENT LEVEL = 4 ?
NO
YES
CURRENT LEVEL = ?
2
3
4
NEW LEVEL = ?
RESTORE DISPLAY POSITIONS
RESTORE SWITCH POSITIONS
REARRANGE SWITCH POSITIONS
REARRANGE DISPLAY POSITIONS
SET LEVEL FLAG TO "0"
E

FIG. 6

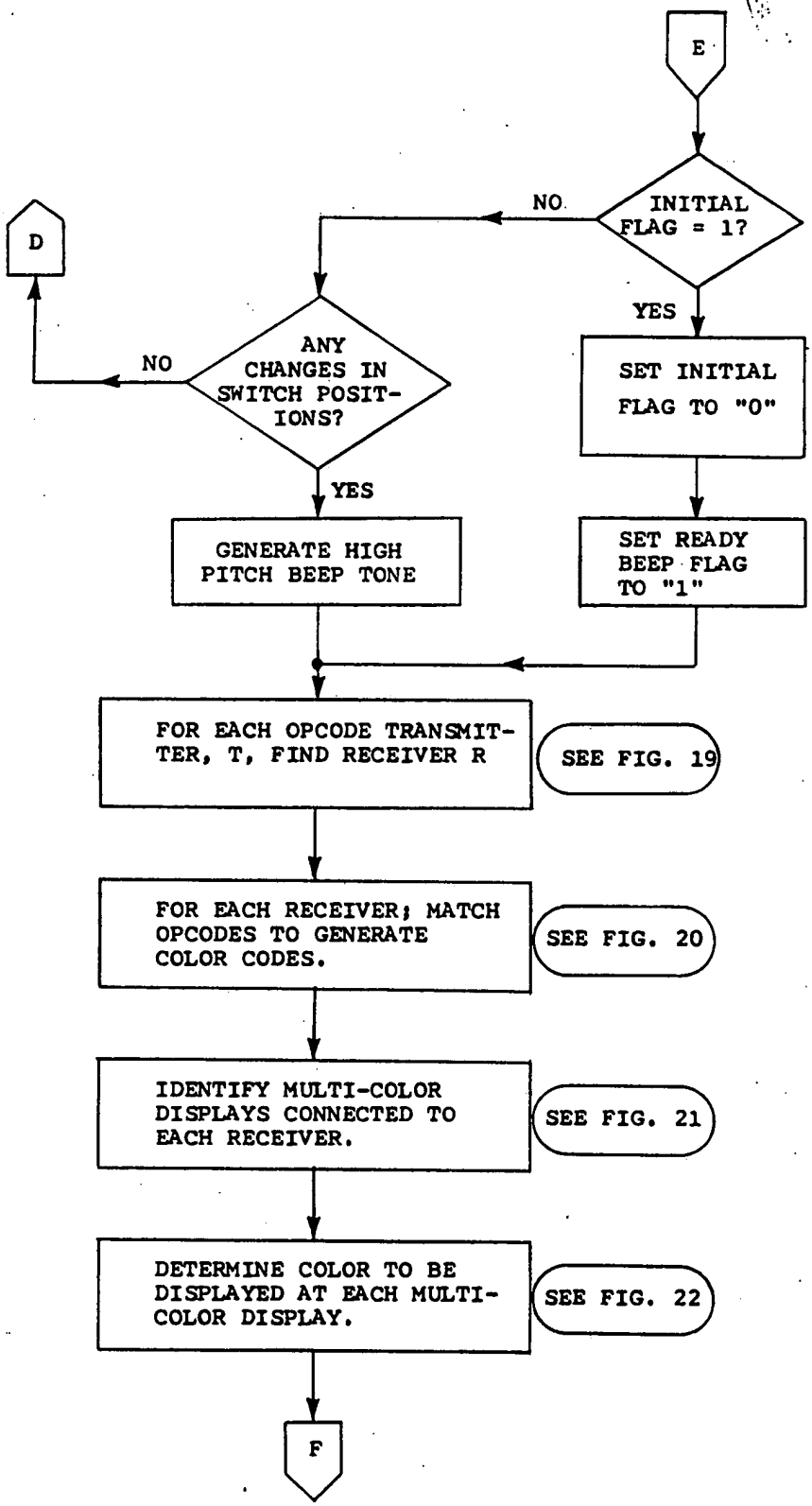

E
INITIAL FLAG = 1?
NO
YES
D
ANY CHANGES IN SWITCH POSIT-IONS?
NO
YES
SET INITIAL FLAG TO "0"
GENERATE HIGH PITCH BEEP TONE
SET READY BEEP FLAG TO "1"
FOR EACH OPCODE TRANSMIT-TER, T, FIND RECEIVER R
SEE FIG. 19
FOR EACH RECEIVER; MATCH OPCODES TO GENERATE COLOR CODES.
SEE FIG. 20
IDENTIFY MULTI-COLOR DISPLAYS CONNECTED TO EACH RECEIVER.
SEE FIG. 21
DETERMINE COLOR TO BE DISPLAYED AT EACH MULTI-COLOR DISPLAY.
SEE FIG. 22
F

FIG. 7

~~396,789~~
96,297,1

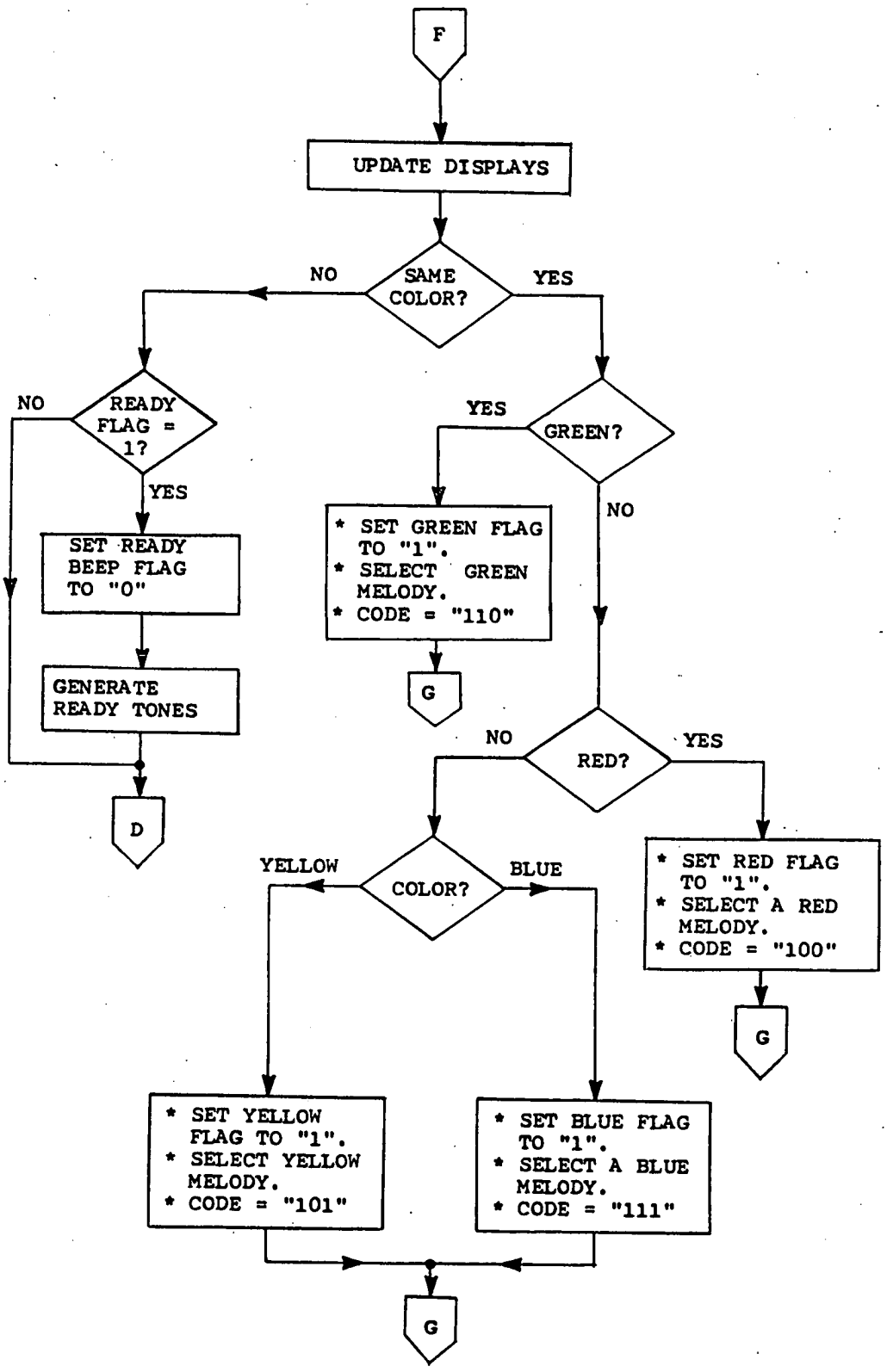


FIG. 8

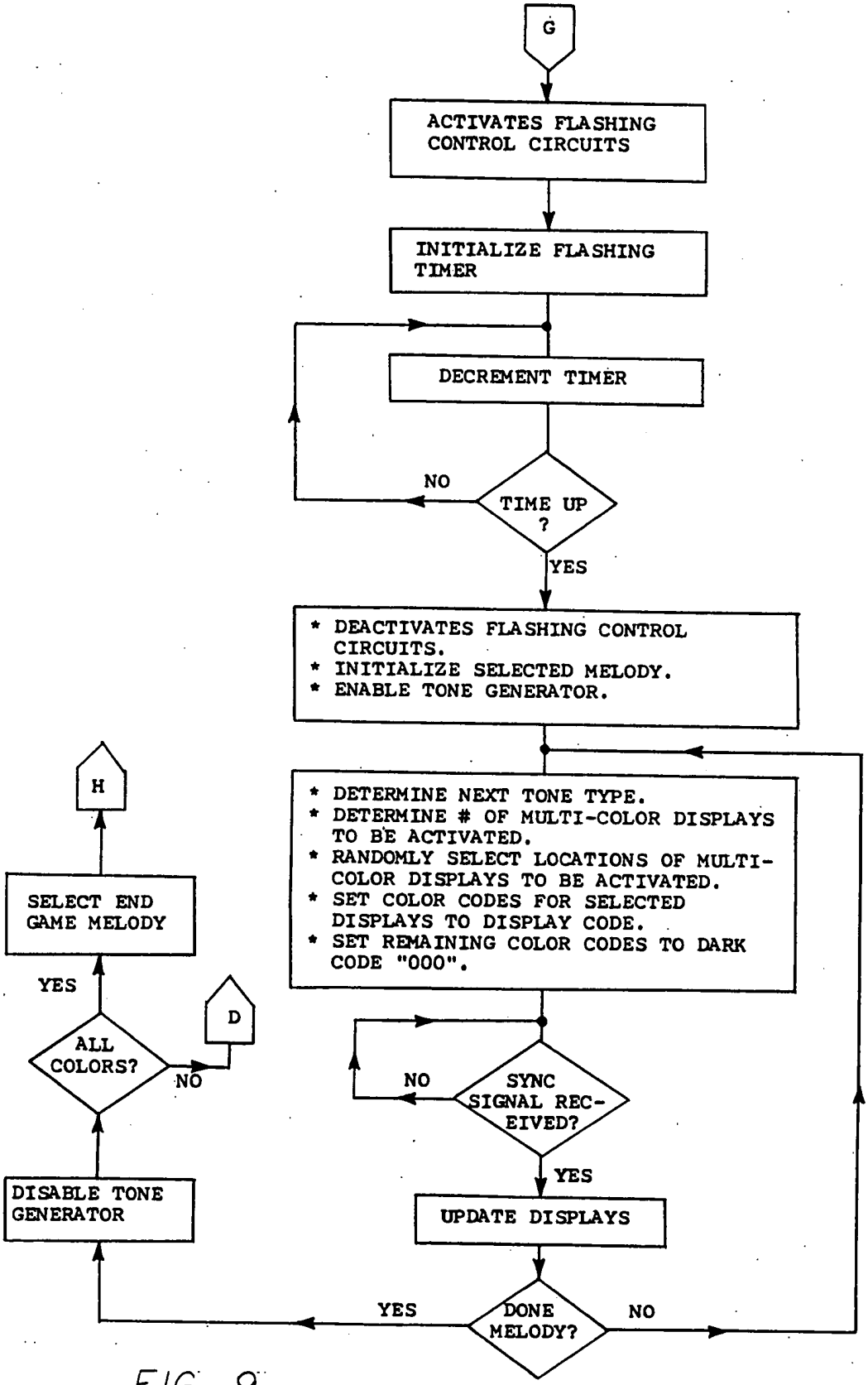

G
ACTIVATES FLASHING CONTROL CIRCUITS
INITIALIZE FLASHING TIMER
DECREMENT TIMER
NO
TIME UP ?
YES
* DEACTIVATES FLASHING CONTROL CIRCUITS.
* INITIALIZE SELECTED MELODY.
* ENABLE TONE GENERATOR.
* DETERMINE NEXT TONE TYPE.
* DETERMINE # OF MULTI-COLOR DISPLAYS TO BE ACTIVATED.
* RANDOMLY SELECT LOCATIONS OF MULTI-COLOR DISPLAYS TO BE ACTIVATED.
* SET COLOR CODES FOR SELECTED DISPLAYS TO DISPLAY CODE.
* SET REMAINING COLOR CODES TO DARK CODE "000".
NO
SYNC SIGNAL REC-EIVED?
YES
UPDATE DISPLAYS
YES
DONE MELODY?
NO
DISABLE TONE GENERATOR
ALL COLORS?
NO
D
YES
SELECT END GAME MELODY
H

FIG. 9

~~376789~~
962971

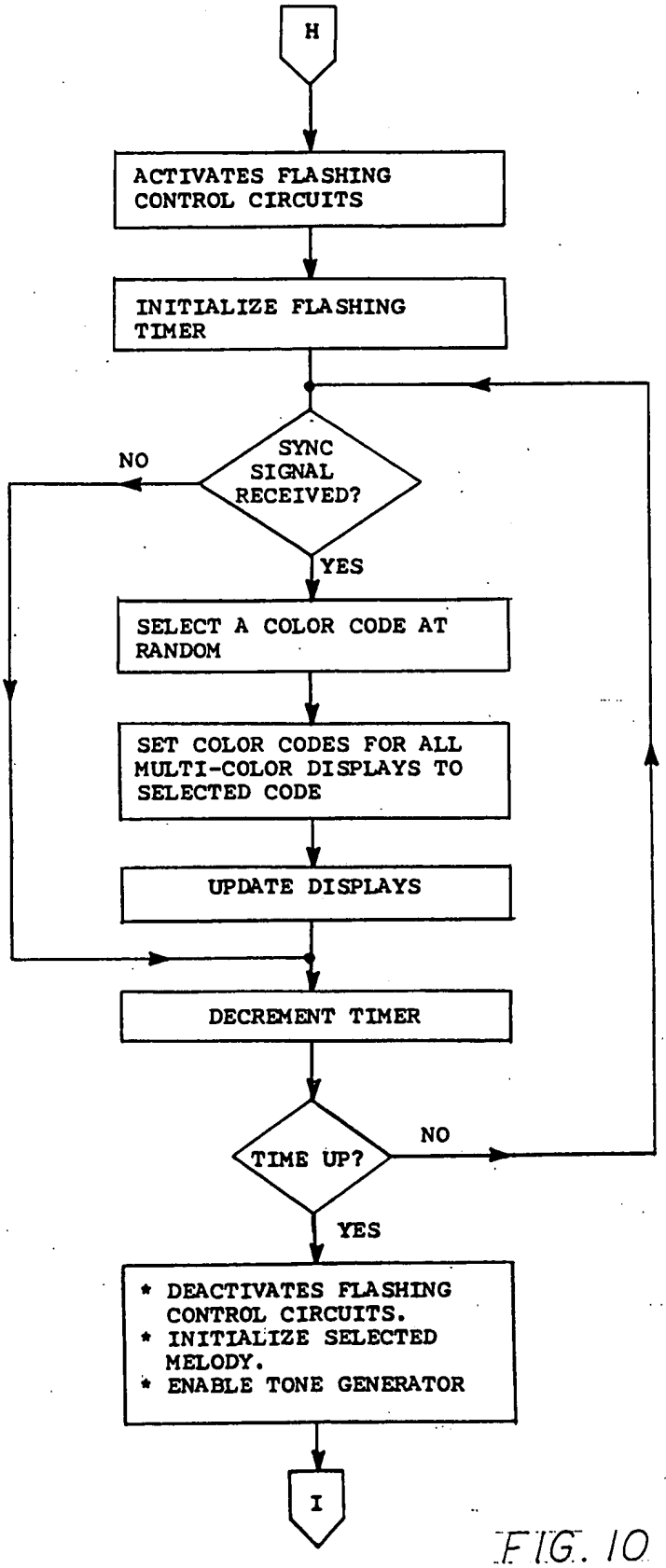


FIG. 10

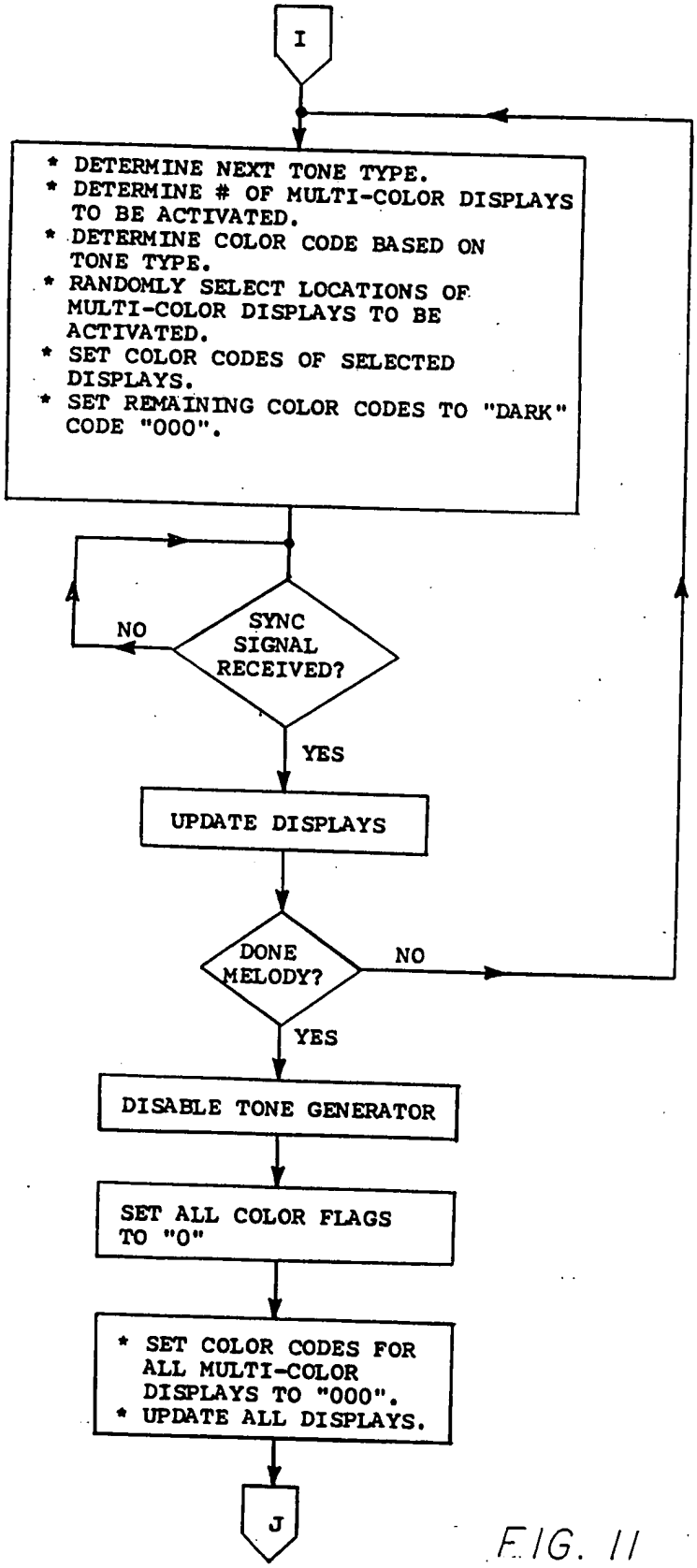

I
* DETERMINE NEXT TONE TYPE.
* DETERMINE # OF MULTI-COLOR DISPLAYS TO BE ACTIVATED.
* DETERMINE COLOR CODE BASED ON TONE TYPE.
* RANDOMLY SELECT LOCATIONS OF MULTI-COLOR DISPLAYS TO BE ACTIVATED.
* SET COLOR CODES OF SELECTED DISPLAYS.
* SET REMAINING COLOR CODES TO "DARK" CODE "000".
SYNC SIGNAL RECEIVED?
NO
YES
UPDATE DISPLAYS
DONE MELODY?
NO
YES
DISABLE TONE GENERATOR
SET ALL COLOR FLAGS TO "0"
* SET COLOR CODES FOR ALL MULTI-COLOR DISPLAYS TO "000".
* UPDATE ALL DISPLAYS.
J

FIG. 11

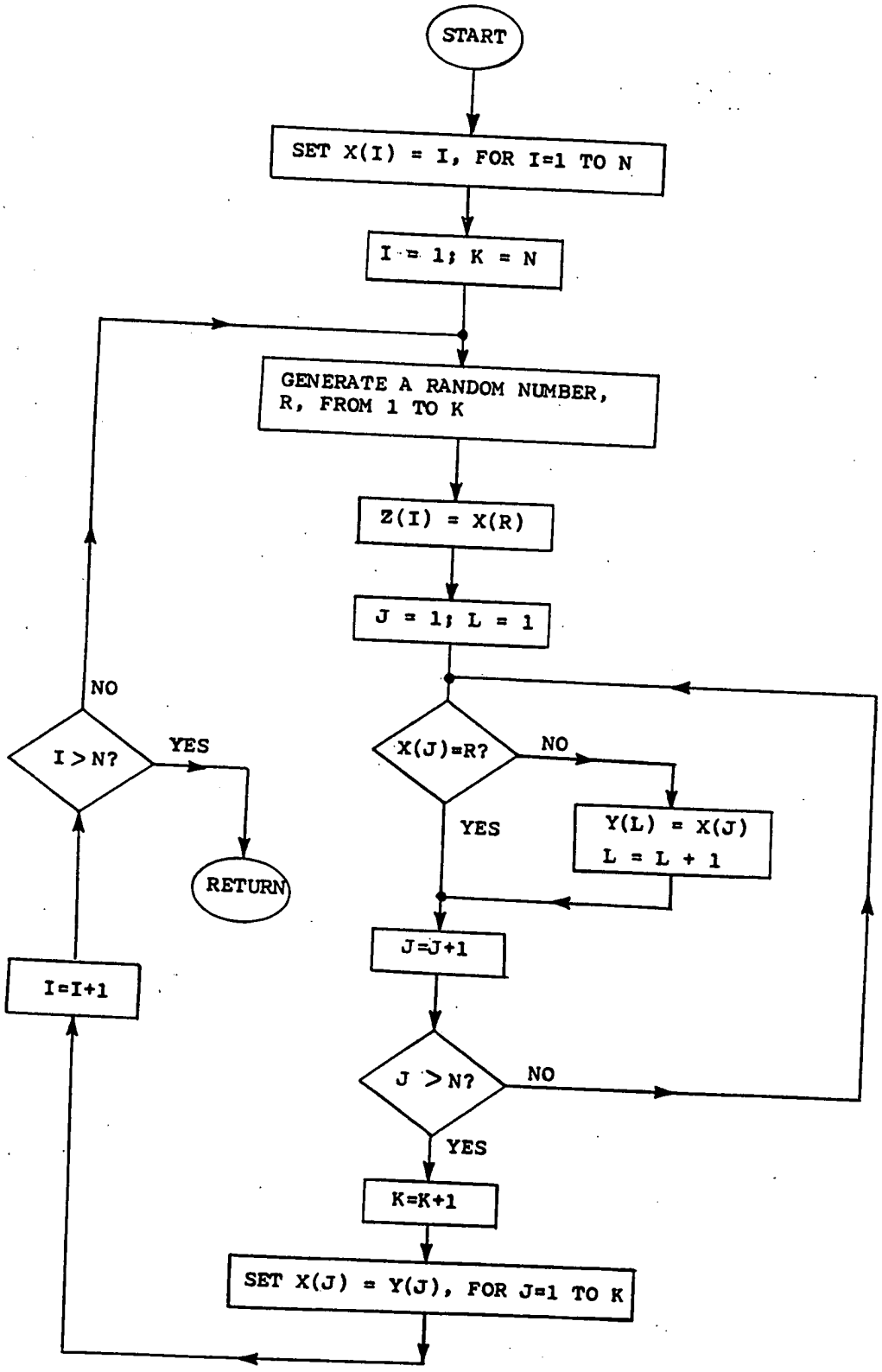

START
SET X(I) = I, FOR I=1 TO N
I = 1; K = N
GENERATE A RANDOM NUMBER, R, FROM 1 TO K
Z(I) = X(R)
J = 1; L = 1
X(J)=R?
NO
YES
Y(L) = X(J)
L = L + 1
J=J+1
J > N?
NO
YES
K=K+1
SET X(J) = Y(J), FOR J=1 TO K
I > N?
NO
YES
RETURN
I=I+1

FIG. 13

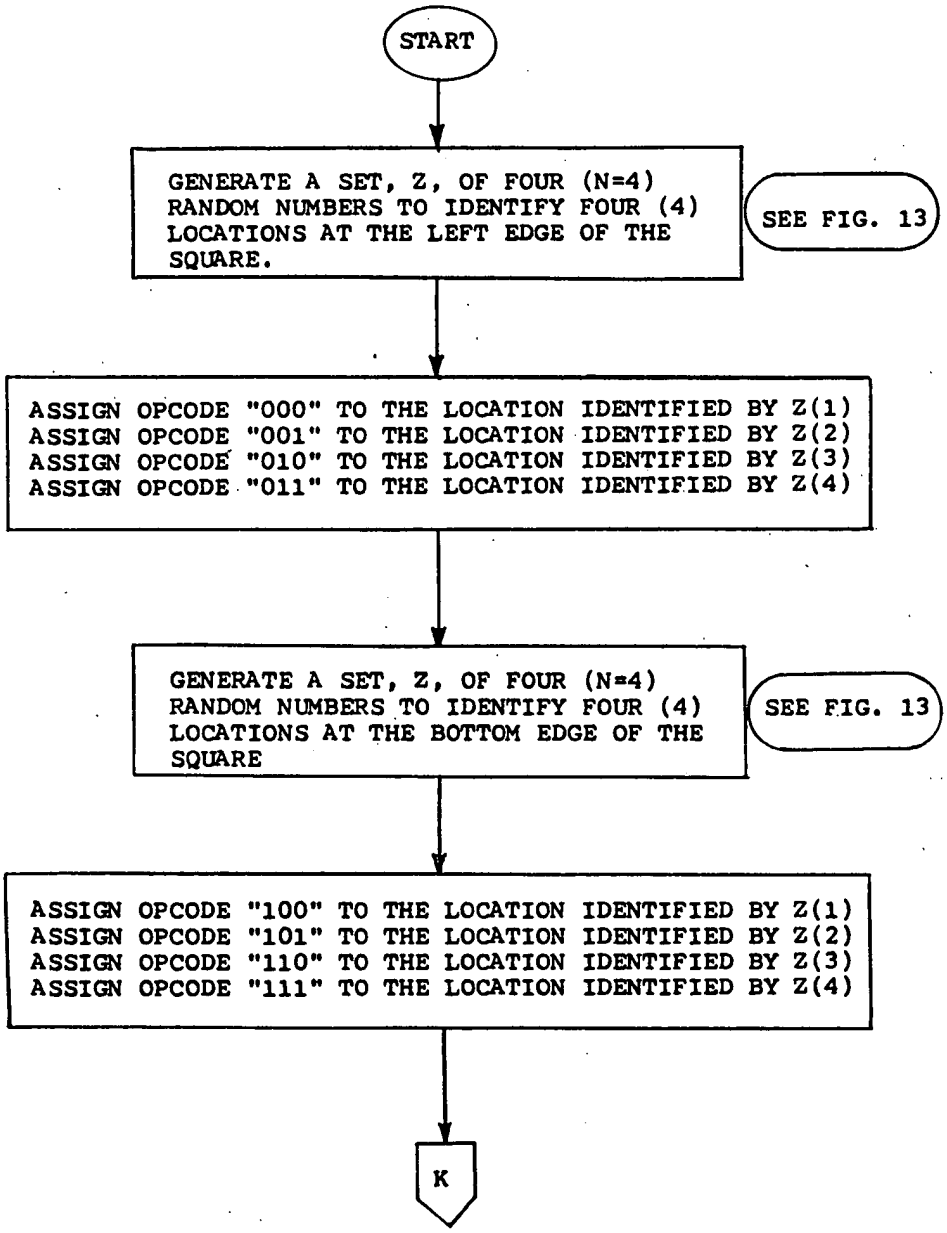

START
GENERATE A SET, Z, OF FOUR (N=4) RANDOM NUMBERS TO IDENTIFY FOUR (4) LOCATIONS AT THE LEFT EDGE OF THE SQUARE.
SEE FIG. 13
ASSIGN OPCODE "000" TO THE LOCATION IDENTIFIED BY Z(1)
ASSIGN OPCODE "001" TO THE LOCATION IDENTIFIED BY Z(2)
ASSIGN OPCODE "010" TO THE LOCATION IDENTIFIED BY Z(3)
ASSIGN OPCODE "011" TO THE LOCATION IDENTIFIED BY Z(4)
GENERATE A SET, Z, OF FOUR (N=4) RANDOM NUMBERS TO IDENTIFY FOUR (4) LOCATIONS AT THE BOTTOM EDGE OF THE SQUARE
SEE FIG. 13
ASSIGN OPCODE "100" TO THE LOCATION IDENTIFIED BY Z(1)
ASSIGN OPCODE "101" TO THE LOCATION IDENTIFIED BY Z(2)
ASSIGN OPCODE "110" TO THE LOCATION IDENTIFIED BY Z(3)
ASSIGN OPCODE "111" TO THE LOCATION IDENTIFIED BY Z(4)
K

FIG. 14

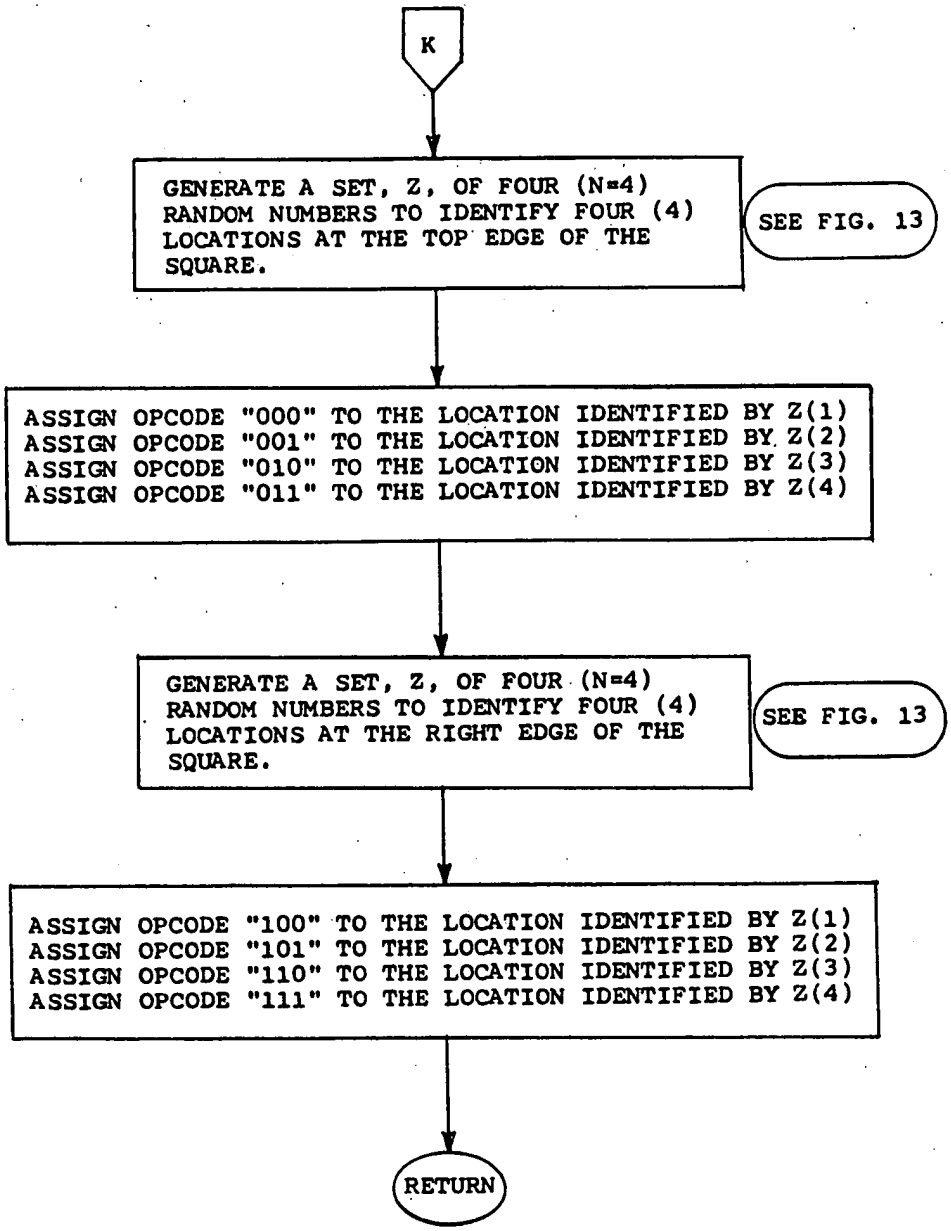

K
GENERATE A SET, Z, OF FOUR (N=4) RANDOM NUMBERS TO IDENTIFY FOUR (4) LOCATIONS AT THE TOP EDGE OF THE SQUARE.
SEE FIG. 13
ASSIGN OPCODE "000" TO THE LOCATION IDENTIFIED BY Z(1)
ASSIGN OPCODE "001" TO THE LOCATION IDENTIFIED BY Z(2)
ASSIGN OPCODE "010" TO THE LOCATION IDENTIFIED BY Z(3)
ASSIGN OPCODE "011" TO THE LOCATION IDENTIFIED BY Z(4)
GENERATE A SET, Z, OF FOUR (N=4) RANDOM NUMBERS TO IDENTIFY FOUR (4) LOCATIONS AT THE RIGHT EDGE OF THE SQUARE.
SEE FIG. 13
ASSIGN OPCODE "100" TO THE LOCATION IDENTIFIED BY Z(1)
ASSIGN OPCODE "101" TO THE LOCATION IDENTIFIED BY Z(2)
ASSIGN OPCODE "110" TO THE LOCATION IDENTIFIED BY Z(3)
ASSIGN OPCODE "111" TO THE LOCATION IDENTIFIED BY Z(4)
RETURN

FIG. 15

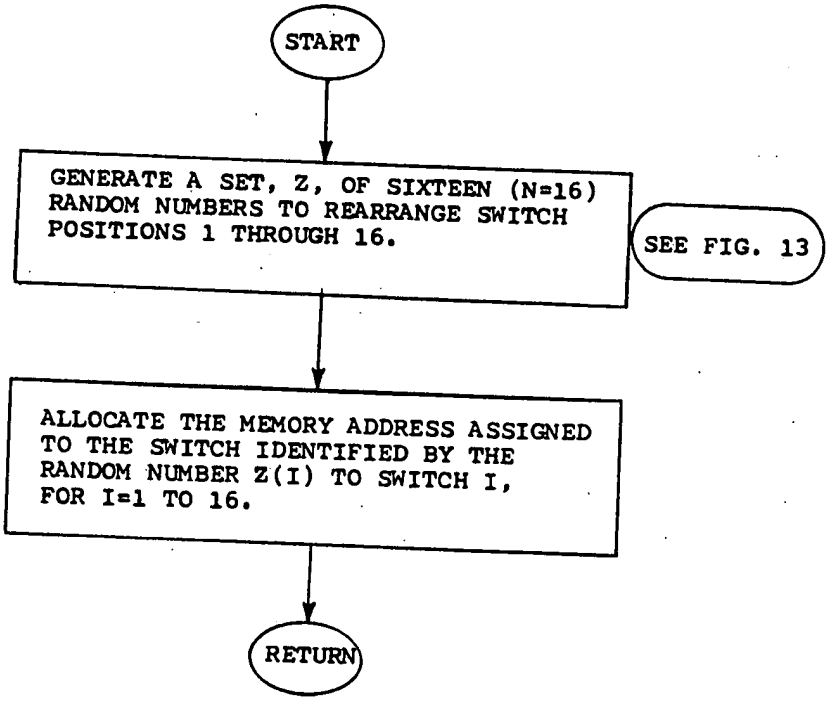

START
GENERATE A SET, Z, OF SIXTEEN (N=16) RANDOM NUMBERS TO REARRANGE SWITCH POSITIONS 1 THROUGH 16.
SEE FIG. 13
ALLOCATE THE MEMORY ADDRESS ASSIGNED TO THE SWITCH IDENTIFIED BY THE RANDOM NUMBER Z(I) TO SWITCH I, FOR I=1 TO 16.
RETURN

FIG. 16

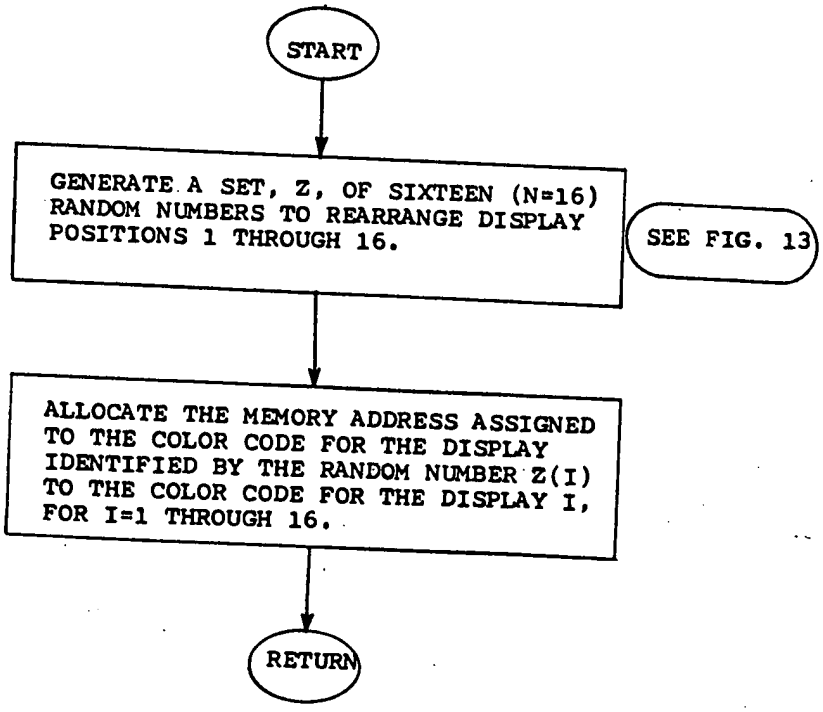

START
GENERATE A SET, Z, OF SIXTEEN (N=16) RANDOM NUMBERS TO REARRANGE DISPLAY POSITIONS 1 THROUGH 16.
SEE FIG. 13
ALLOCATE THE MEMORY ADDRESS ASSIGNED TO THE COLOR CODE FOR THE DISPLAY IDENTIFIED BY THE RANDOM NUMBER Z(I) TO THE COLOR CODE FOR THE DISPLAY I, FOR I=1 THROUGH 16.
RETURN

FIG. 17

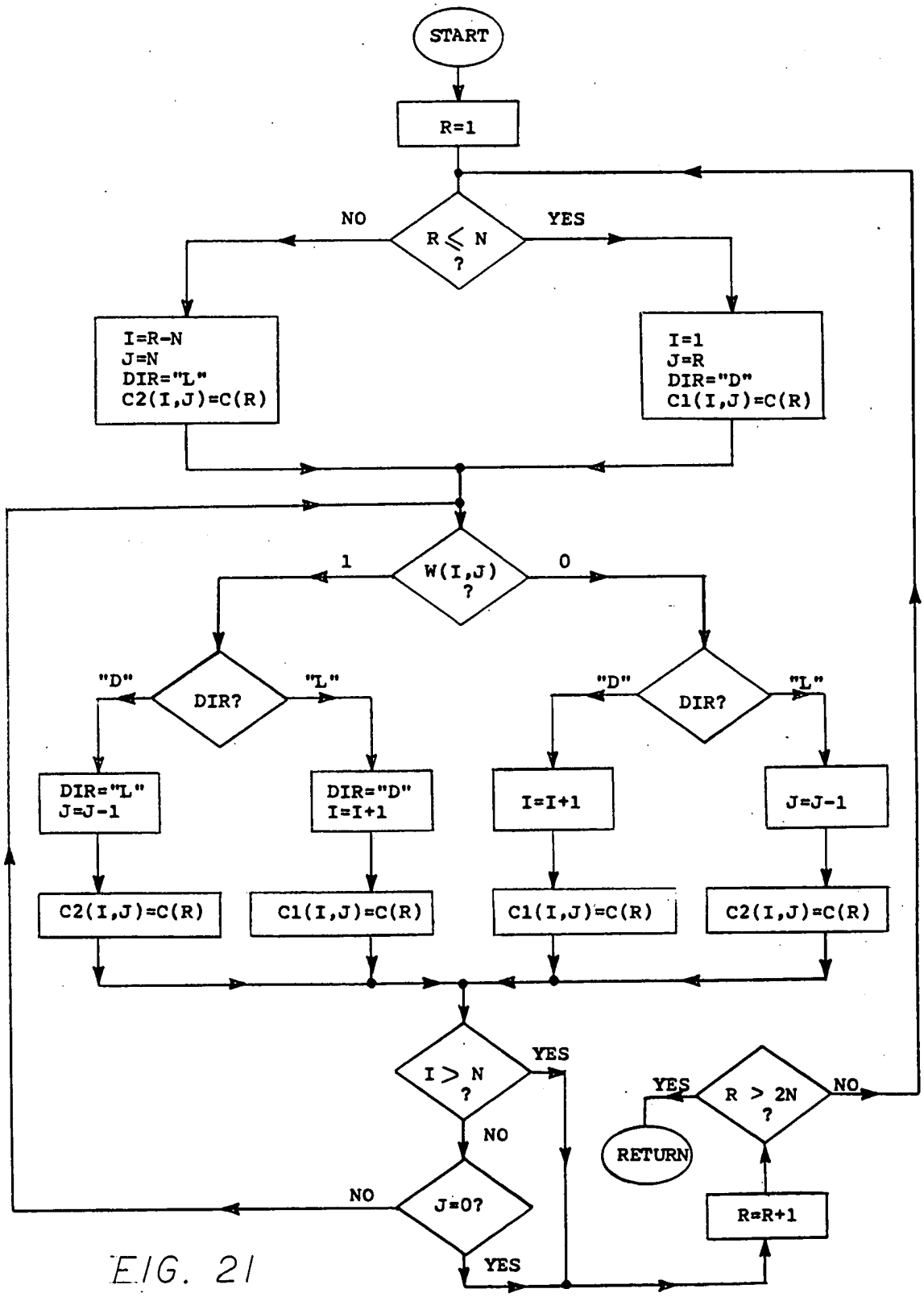

START
R=1
R ≤ N ?
NO
YES
I=R-N
J=N
DIR="L"
C2(I,J)=C(R)
I=1
J=R
DIR="D"
C1(I,J)=C(R)
W(I,J) ?
1
0
DIR?
"D"
"L"
DIR="L"
J=J-1
DIR="D"
I=I+1
I=I+1
J=J-1
C2(I,J)=C(R)
C1(I,J)=C(R)
C1(I,J)=C(R)
C2(I,J)=C(R)
I > N ?
YES
NO
J=0?
NO
YES
R > 2N ?
YES
NO
RETURN
R=R+1

FIG. 21

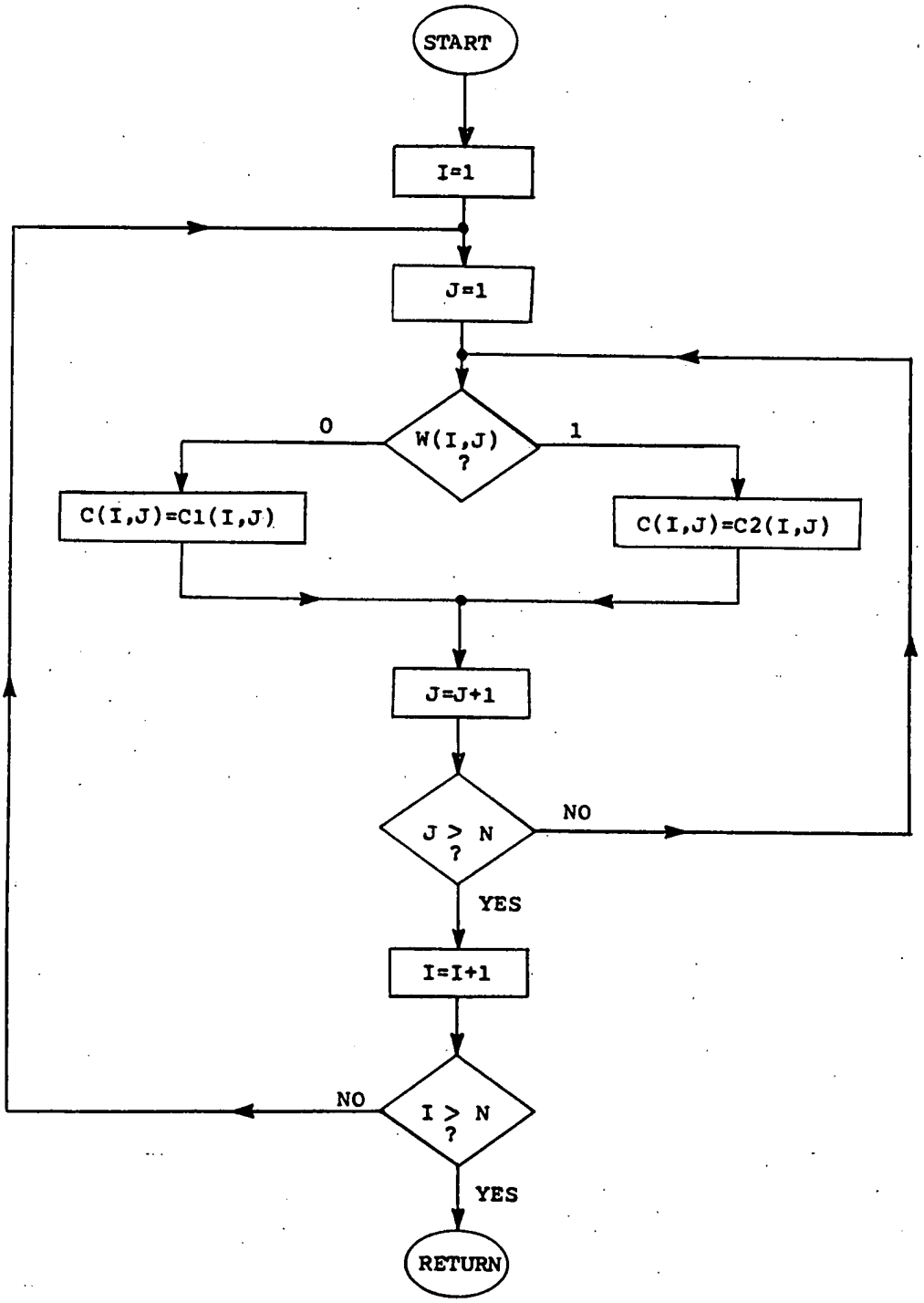
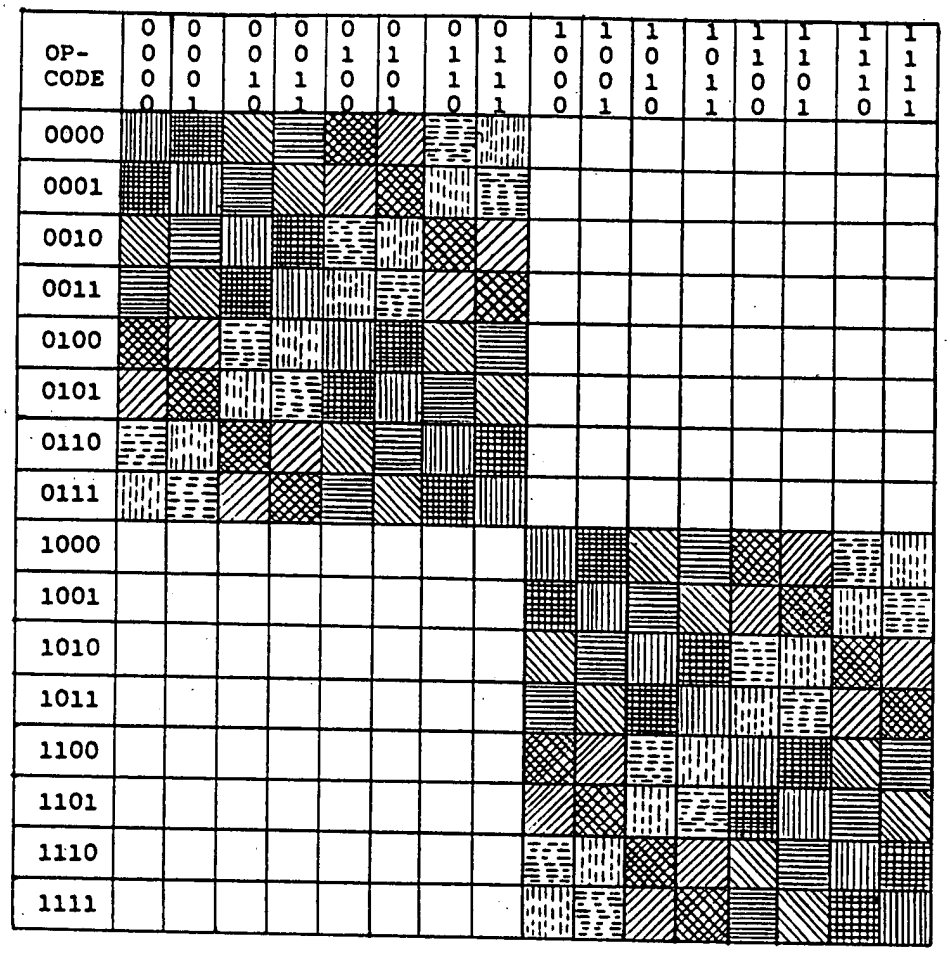

START
I=1
J=1
W(I,J) ?
0
1
C(I,J)=C1(I,J)
C(I,J)=C2(I,J)
J=J+1
J > N ?
NO
YES
I=I+1
I > N ?
NO
YES
RETURN

FIG. 22



COLOR CODE	1000	1001	1010	1011	1100	1101	1110	1111
COLOR								

COLOR ASSIGNMENTS FOR N = 8

FIG. 24